Material Safety Data Sheet
The Dow Chemical Company

Product Name: PHENOL SYNTHETIC

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The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
PHENOL SYNTHETIC

COMPANY IDENTIFICATION
The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
United States

Customer Information Number: 800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview
Color: White
Physical State: Crystals
Odor: Aromatic
Hazards of product:

Danger - Poison! Combustible liquid and vapor. May be fatal if absorbed through skin. Causes severe eye burns. Causes severe skin burns. Causes burns of the mouth and throat. Causes respiratory tract irritation. Harmful if swallowed. May be harmful if inhaled. May cause central nervous system effects. May cause lung injury. Evacuate area. Keep upwind of spill. Overheating of transport vehicles and storage vessels must be prevented.

OSHA Hazard Communication Standard
This product is a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.
Skin Contact: Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness and tissue damage.
Skin Absorption: Rapidly absorbed through skin in amounts which could cause death.
Inhalation: Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. Prolonged excessive exposure may cause adverse effects. May cause pulmonary edema (fluid in the lungs.) May cause central nervous system effects. Effects may be delayed.
Ingestion: Moderate toxicity if swallowed. Swallowing may result in burns of the mouth and throat.
Aspiration hazard: Based on physical properties, not likely to be an aspiration hazard.
Effects of Repeated Exposure: Repeated excessive exposure to phenol may cause central nervous system effects (including respiratory, motor difficulties, and paralysis), digestive disturbances, liver and kidney effects.
Birth Defects/Developmental Effects: Phenol has been toxic to the fetus in laboratory animals at doses toxic to the mother. Birth defects (cleft palate) were seen in mice at maternally lethal doses. This is a common developmental abnormality in mice and is associated with stress to the maternal animals.

3. Composition Information

Component	CAS #	Amount
Phenol	108-95-2	> 99.9 %

4. First-aid measures

Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.
Skin Contact: Initial decontamination of any exposure to phenol should immediately be flushed with copious amounts of water. All potentially contaminated clothing and shoes should be removed while the exposed individual is in the safety shower. A thorough washing using water and a non-abrasive soap should be done for a minimum of 30 minutes. Destroy contaminated leather items such as shoes, belts, and watchbands. At facilities with availability of a decontamination solution and delivery equipment, such systems can be used to supplement the initial soap and water decontamination. Exposed areas should be immediately washed with copious amounts of water and non-abrasive soap for 1-2 minutes prior to the use of Phenol Decontamination Equipment. Spray mixture on affected body parts, from top to bottom (injured person.s eyes should be closed). Immediately resume shower, wash off treatment mixture for 1-2 minutes. Step out of shower stream or stop shower, and re-spray affected areas with treatment mixture. Resume shower, wash of treatment mixture for 1-2 minutes; continue this cycle of spray and rinse until rescue services arrive. Example decontamination mixtures include PEG300/ethanol (or industrial methylated spirits) 2:1, or available polypropylene/rapeseed oil proprietary mixtures, or polyvinylpyrrolidone/detergent mixtures. Alternatively this material may be removed from the skin by repeatedly spraying/swabbing the skin with polyethylene glycol or polypropylene glycol mixture, alternating with rinsing with large quantites of water for 1 - 2 minutes. This cycle of spraying/swabbing the skin and rinsing should continue for 30 minutes. Phenol destroys the nerve endings in the skin; the absence of pain does not necessarily mean the skin has been properly decontaminated. Suitable emergency safety shower facility should be immediately available.
Eye Contact: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation,

preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.
Ingestion: Seek medical attention immediately. Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth unless the person is fully conscious. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. If burn is present, treat as any thermal burn, after decontamination. The determination of urinary phenols may be useful in determining the extent of exposure. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.
Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

5. Fire Fighting Measures

Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function. Water fog, applied gently may be used as a blanket for fire extinguishment.

Special hazards arising from the substance or mixture

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Hydrocarbons. Carbon monoxide. Carbon dioxide.
Unusual Fire and Explosion Hazards: Container may vent and/or rupture due to fire. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Cool surroundings with water to localize fire zone. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment.
Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Evacuate area. Only trained and properly protected personnel must be involved in clean-up operations. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to Section 7, Handling, for additional precautionary measures.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Absorb with materials such as: Sand. Dirt. Non-combustible material. Large spills: Remove with shovel. Collect in suitable and properly labeled containers. Suitable containers include: Steel drums. Contact Dow for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

7. Handling and Storage

Handling
General Handling: Do not get in eyes, on skin, on clothing. Avoid breathing vapor. Do not swallow. Keep away from heat, sparks and flame. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling. Product shipped/handled hot can cause thermal burns. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.
Other Precautions: Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers.

Storage
Do not store in: Brass. Bronze. Copper. Iron. Lead. Avoid moisture. Avoid contact with air (oxygen). Overheating of transport vehicles and storage vessels must be prevented as it may result in a potential spill through thermal expansion.

Shelf life: Use within	Storage temperature:
12 Months	< 60 °C < 140 °F

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Phenol	ACGIH	TWA	5 ppm SKIN, BEI
	OSHA Table Z-1	PEL	19 mg/m3 5 ppm SKIN

A BEI notation following the exposure guideline refers to a guidance value for assessing biological monitoring results as an indicator of the uptake of a substance from all routes of exposures.
A “skin” notation following the inhalation exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapors or by direct skin contact.
It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

Personal Protection
Eye/Face Protection: Use chemical goggles. Wear a face-shield which allows use of chemical goggles, or wear a full-face respirator, to protect face and eyes when there is any likelihood of splashes.
Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Use chemical protective clothing resistant to this material, when there is any possibility of skin contact.

Hand protection: Use gloves, chemically resistant to this material, at all times. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl vinyl alcohol laminate (“EVAL”). Polyvinyl chloride (“PVC” or “vinyl”). Styrene/butadiene rubber. Examples of acceptable glove barrier materials include: Natural

rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.

Engineering Controls

Ventilation: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Appearance	
Physical State	Crystals
Color	White
Odor	Aromatic
Odor Threshold	No test data available
pH	Not applicable
Melting Point	40.9 °C (105.6 °F) *Literature*
Freezing Point	40.9 °C (105.6 °F) *Literature*
Boiling Point (760 mmHg)	181.8 °C (359.2 °F) *Literature* .
Flash Point - Closed Cup	81 °C (178 °F) *Literature*
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	The product is not flammable. *Literature*
Flammable Limits In Air	**Lower**: 1.4 %(V) *Literature* **Upper**: 9.5 %(V) *Literature*
Vapor Pressure	0.15 hPa @ 20 °C *Literature*
Vapor Density (air = 1)	1.07 @ 20 °C *Literature*
Specific Gravity (H2O = 1)	1.132 25 °C/4 °C *Literature*
Solubility in water (by weight)	84 g/l @ 20 °C *Literature*
Partition coefficient, n-octanol/water (log Pow)	1.47 *Measured*
Autoignition Temperature	715 °C (1,319 °F) *Literature*
Decomposition Temperature	No test data available
Dynamic Viscosity	3.437 mPa.s @ 50 °C
Kinematic Viscosity	No test data available
Explosive properties	no data available
Oxidizing properties	no data available
Molecular Weight	94.0 g/mol *Literature*
Surface tension	71.3 mN/m @ 20 °C *0.118% solution of phenol in water*
Henry's Law Constant (H)	2.2E-02 Pa*m3/mole.; 20 °C Calculated

10. Stability and Reactivity

Reactivity
No dangerous reaction known under conditions of normal use.

Chemical stability
Unstable at elevated temperatures.

Possibility of hazardous reactions
Polymerization will not occur.

Conditions to Avoid: Avoid contact with air (oxygen). Exposure to elevated temperatures can cause product to decompose. Avoid static discharge. Avoid moisture. Avoid direct sunlight.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers. Avoid contact with metals such as: Zinc. Magnesium.

Hazardous decomposition products
Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Hydrocarbons. Toxic flammable gases can be released during decomposition.

11. Toxicological Information

Acute Toxicity
Ingestion
LD50, rat, male and female 340 mg/kg
Dermal
LD50, rabbit 850 mg/kg
LD50, rat, female 660 mg/kg
Inhalation
LC50, 8 h, Mist, rat > 1.8 mg/l

Eye damage/eye irritation
May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Skin corrosion/irritation
Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness and tissue damage.

Sensitization
Skin
Did not cause allergic skin reactions when tested in guinea pigs.
Respiratory
No relevant data found.

Repeated Dose Toxicity
Repeated excessive exposure to phenol may cause central nervous system effects (including respiratory, motor difficulties, and paralysis), digestive disturbances, liver and kidney effects.

Chronic Toxicity and Carcinogenicity
Did not cause cancer in laboratory animals.

Developmental Toxicity
Phenol has been toxic to the fetus in laboratory animals at doses toxic to the mother. Birth defects (cleft palate) were seen in mice at maternally lethal doses. This is a common developmental abnormality in mice and is associated with stress to the maternal animals.

Reproductive Toxicity
In animal studies, phenol did not interfere with reproduction. Toxicity to the newborn animals was observed at doses that were toxic to the maternal animals.

Genetic Toxicology
In vitro genetic toxicity studies were negative in some cases and positive in other cases.

12. Ecological Information

Toxicity

Data for Component: **Phenol**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity
LC50, Oncorhynchus mykiss (rainbow trout), 96 h: 5.02 - 13.1 mg/l
Aquatic Invertebrate Acute Toxicity
LC50, Ceriodaphnia Dubia (water flea), 48 h: 4.3 - 20 mg/l
Aquatic Plant Toxicity
EC50, Pseudokirchneriella subcapitata, static test, Growth inhibition (cell density reduction), 96 h: 61.1 mg/l
Toxicity to Micro-organisms
EC50; activated sludge: 110 - 800 mg/l
Fish Chronic Toxicity Value (ChV)
Pimephales promelas (fathead minnow), 28 d

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.
OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
62 %	100 h	OECD 301C Test	Not applicable
85 %	14 d	OECD 301C Test	Not applicable

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
3.34673E-11 cm3/s	3.8 h	Estimated.

Theoretical Oxygen Demand: 2.38 mg/mg

Bioaccumulative potential

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient, n-octanol/water (log Pow): 1.47 Measured
Bioconcentration Factor (BCF): 10 - 39; Other; Measured

Mobility in soil

Mobility in soil: Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient, soil organic carbon/water (Koc): 27 - 91 Estimated.
Henry's Law Constant (H): 2.2E-02 Pa*m3/mole.; 20 °C Calculated

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
Proper Shipping Name: PHENOL, SOLID
Hazard Class: 6.1 **ID Number:** UN1671 **Packing Group:** PG II

DOT Bulk
Proper Shipping Name: PHENOL, MOLTEN
Hazard Class: 6.1 **ID Number:** UN2312 **Packing Group:** PG II

IMDG
Proper Shipping Name: PHENOL, MOLTEN
Hazard Class: 6.1 **ID Number:** UN2312 **Packing Group:** PG II
EMS Number: F-A,S-A
Marine pollutant.: No

ICAO/IATA
FORBIDDEN FOR AIR SHIPMENT.
Additional Information

Reportable quantity: 1,001 lb – PHENOL

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
Phenol	108-95-2	> 99.9 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:
The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Phenol	108-95-2	> 99.9 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

US. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

16. Other Information

Recommended Uses and Restrictions
Identified uses
Chemical intermediate.

Revision
Identification Number: 50071 / 1001 / Issue Date 03/28/2013 / Version: 4.0
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.